

SECTION- A

Date _____ 20 _____

General Instructions

1. Give numbering to headings
2. Do not write lengthy paragraphs. Write medium sized paragraphs with headings
3. Do not use table for comparison and contrast questions

QUESTION # 03

ANSWER:

4. Draw figures/diagram/flowchart where needed.
5. Start new question from fresh page.
6. Write unit of the answer in ability section.
7. Explain mathematical steps and the reasoning for better score.
8. Change colour scheme for references to give them more visibility.
9. Manage time well.
10. Wide page borders are discouraged.

A. POLIO:

- Should be reasonable.
11. Avoid writing wrong references
12. Give more weightage to expressly asked part/s of the question.

Polio is a virus, which infects humans and targets various organs of human body such as: brain, spinal cord, intestine, stomach etc.

Pathology:

Polio virus is inactivated outside living cell and need enzymatic machinery for its reproduction, which is why it required human cells to get activated and reproduction. Polio virus can get enter in human body through contaminated water or food and invades lymphatic system through tonsils. It then travels to small intestine and prepare itself to replicate and shed its progeny in faeces, to contaminate more more water for re-entry in another human to complete its cycle. In this way Polio virus infect human body by altering basic cell functions and complete its reproduction.

Causes of Polio:

- a. Direct Contact with Infected human.
- b. Contaminated food or water.

Symptoms:

i. Abortive Poliomyelitis

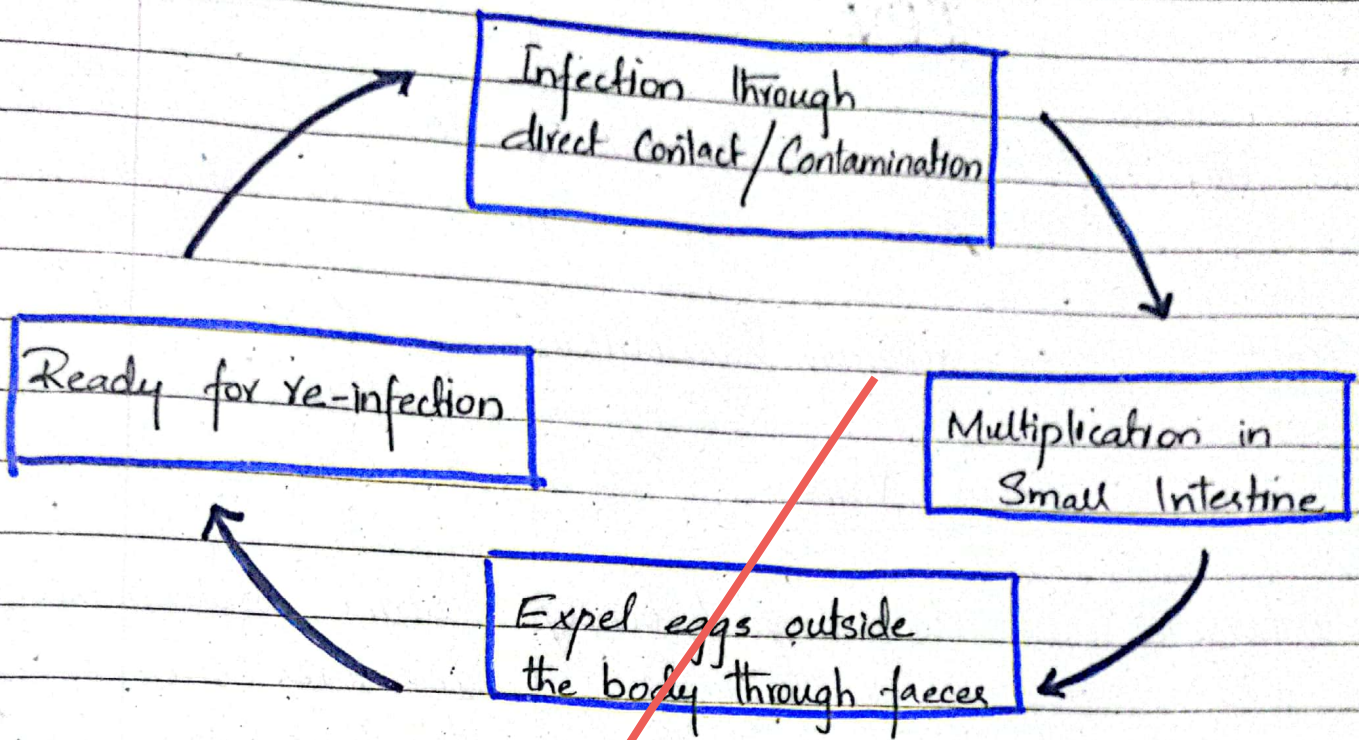
- Fever
- Headache
- Stomachache
- Vomiting
- Diarrhea

ii. Non-Paralytic Poliomyelitis

- Fever
- Headache
- Neck stiffness
- Meningitis
- Vomiting

iii. Paralytic Poliomyelitis.

- Fever
- Headache
- Paralysis of voluntary muscles.
- Paralysis of involuntary muscles.



Treatment:

For initial stages of Polio infection or non-invasion of organism at severe level such as abortive or non-paralytic Poliomyelitis, ~~the~~ symptomatic treatment is given or it is treated naturally through natural immunity present in the form of antibodies in human body.

Prevention:

Poliomyelitis is prevented through vaccines in injection or oral form (IPV or OPV) which prevent humans from virulent nature of the virus and future invasion.

IPVOPV

Full form: It is known as Injectable Polio Vaccine

It is known as Oral Polio Vaccine

Route: Intra muscular / Subcutaneous

Oral

Nature: Killed Virus

live ~~attenuated~~ Virus

Maintenance: No stringent protectionary measures are required during export.

Strict protectionary measures are required to keep its effect

Preventions: Prevents Paralysis but does not prevent re-infection

Prevents Paralysis and intestinal infection. It also prevents from re-infection.

Effect: Not useful in epidemics

It is most effective in epidemics.

B. ANSWER:NERVOUS SYSTEM:

Definition:

Nervous System is organ system consisting of Brain, spinal cord and nerves. It functions as relying body for every thought process and orders for every single bodily action.

Components:

Nervous System consists of:

- Brain
- Spinal Cord
- Nerves

Functions:

- Voluntary movement
- Involuntary muscle movement
- Balance
- Position
- Processing sensory information
- Commands orders through motor neurons
- Maintains function of other organ systems
e.g. Excretory system, Circulatory system,
Digestive system

1. Parts of Nervous System

There are two broad categories of nervous system namely Central nervous system and Peripheral nervous system, which are described below:

i. Central Nervous System:

Central Nervous System is the fundamental part of nervous system, chiefly consisting of Brain and Spinal Cord. Central Nervous System receives sensory information through neurons and is processed in brain, which commands for further actions through motor neurons.

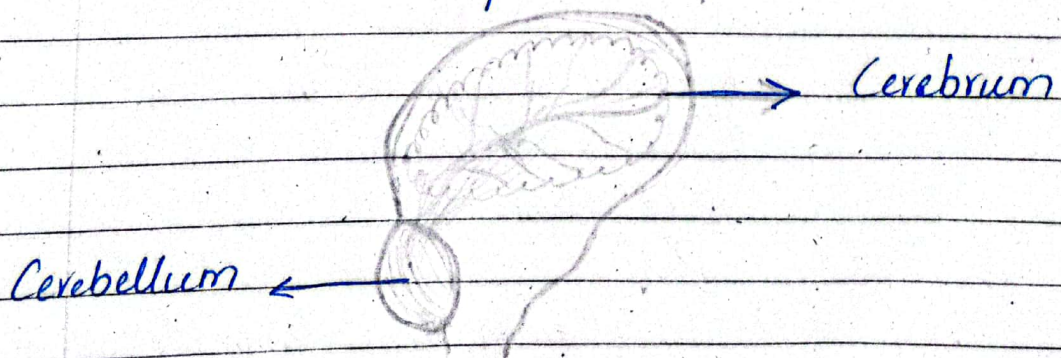
a. Brain:

Brain is fundamental organ participating in central nervous system, which is covered in hard body structure called skull or vault. It is protected by meninges which are protective layer, consisting of fluid for cushioning and shock absorbing. There are various parts of Brain obliged to do specific functions.

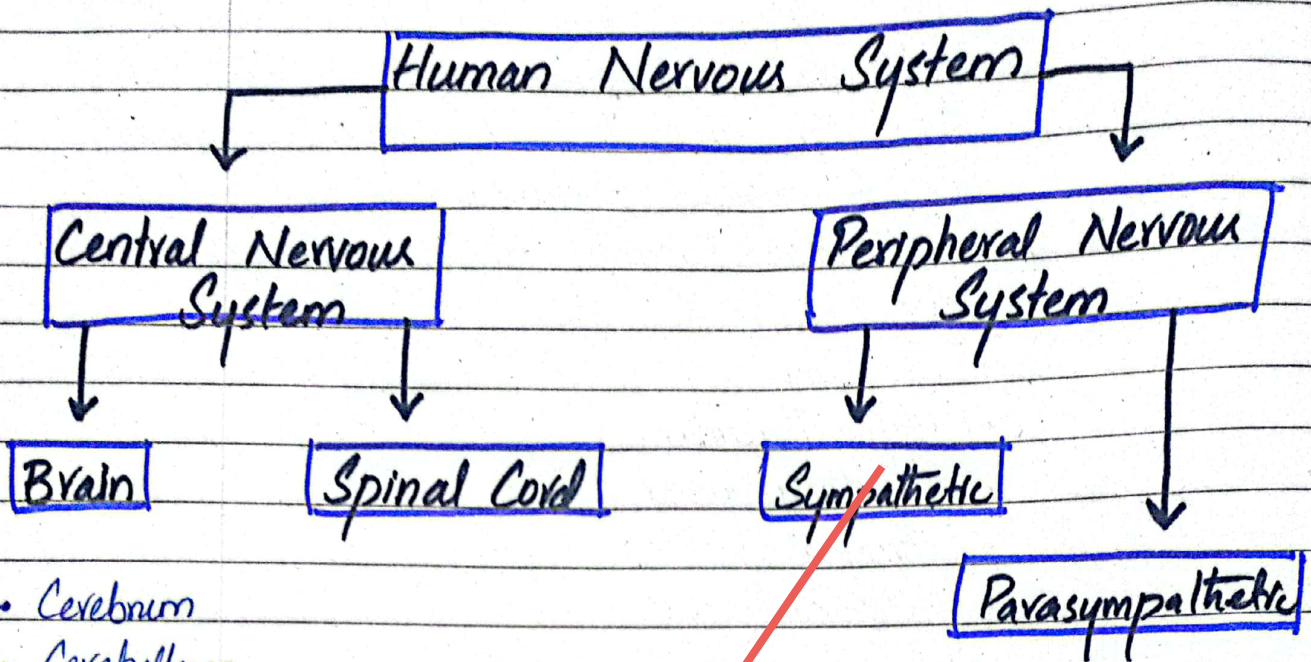
- **Cerebrum:** Cerebrum is largest part of brain, which consists of cortex and cell bodies of every neurons. It is divided into two right and left hemispheres connected through corpus callosum. It process every information through many sub-parts such as:

- Thalamus
- Hypo-Thalamus
- Pituitary gland
- Amygdala
- Hippocampus

- **Cerebellum:** It is round shaped part of brain present at occipital region of brain. It functions for balance, voluntary movement and position. Main disease related to it is Parkinson's Disease in human body due to defect in dopamine-generating neurons "Substantia nigra".



Human Brain:



(b) Spinal Cord

Spinal Cord is tubular structure arising from Brain, which functions as transport mechanism to receive and transport information from brain to muscles through neurons.

• Components of Brain Stem:

- Medulla Oblongata
- Mid Brain
- Pons

Brain stem connects Cerebrum (part of Brain) to spinal cord. It mainly regulate important involuntary movements and functions such as maintenance of blood

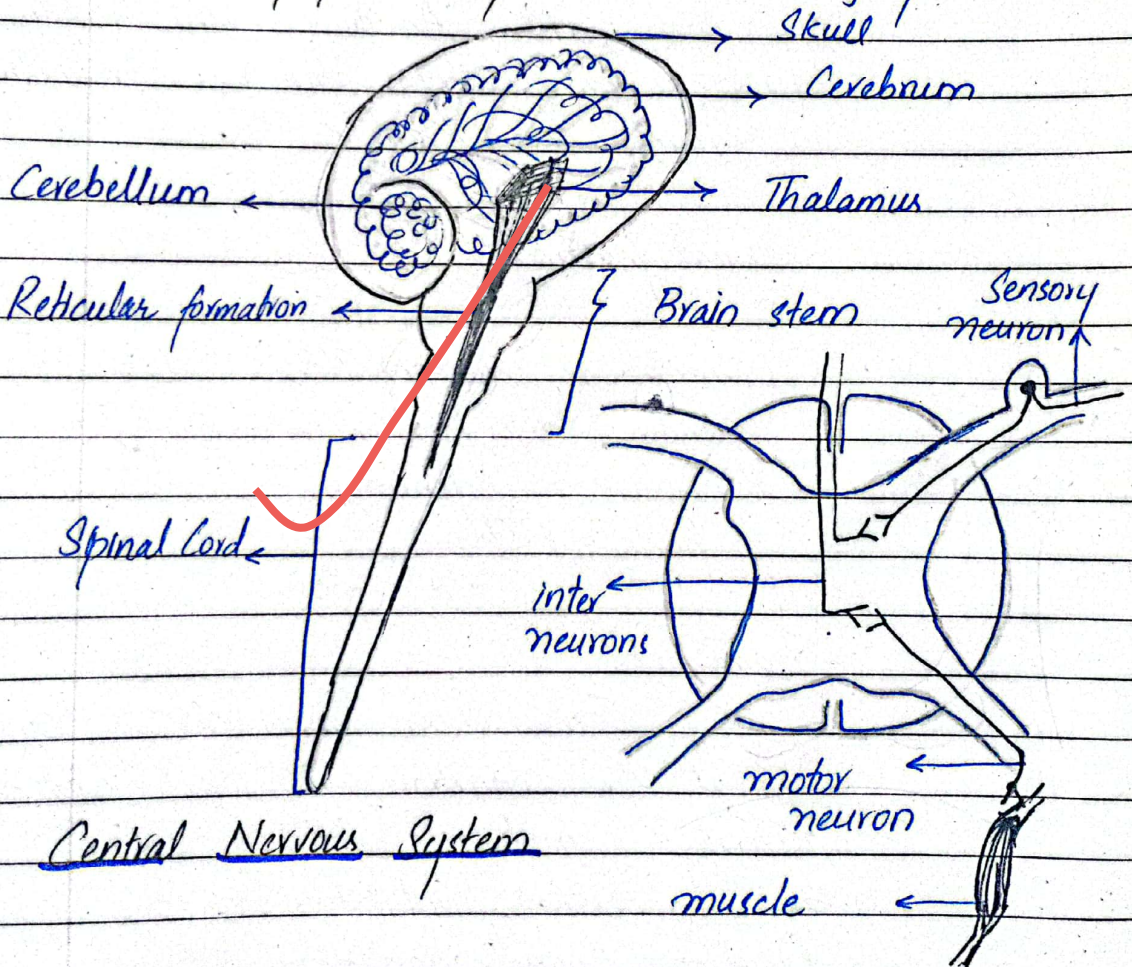
pressure, body temperature, heart rate, sleep cycle, appetite and breathing pattern.

Peripheral Nervous System:

Peripheral Nervous System consists of spinal nerves (31 pairs) which functions based on sympathetic or parasympathetic pathway.

Sympathetic spinal nerves: Fight or Flight Response

Parasympathetic spinal nerves: Resting response.



Central Nervous System

Cross-Section Diagram of Spinal Cord

2. Alzheimer Disease

Alzheimer Disease is a progressive brain disease, most commonly ~~of~~ occurs at old age.

Pathology:

Alzheimer disease occurs due to malfunction of brain's function, which occurs due to excess abnormal build-up of protein called "Amyloid". This protein alter normal cellular functions resulting in memory loss.

Clinical features:

- Dementia or memory loss
- Cognitive disorders
- Psychological symptoms
- Behavioural changes, e.t.c

Treatment:

There is no any specific drug to treat the condition, although mild to moderate symptoms can be subsided by ~~ed~~ cholinesterase inhibitors such as: Rivastigmine and donepezil.

c. CARBOHYDRATES.

Definition :-

Carbohydrates are one of major macromolecules required for energy in human body. It consists of many monomers such as monosaccharides, disaccharides or polysaccharides.

Structure :-

Carbohydrates mainly composed of basic generic structure of $(C_nH_{2n}O_n)$. It consists of three elements mainly carbon, hydrogen, and oxygen.

Classification :-

Monosaccharide \rightarrow Glucose $\rightarrow C_6H_{12}O_6$

Disaccharide \rightarrow Maltose $\rightarrow C_6H_{12}O_6 + C_6H_{12}O_6$

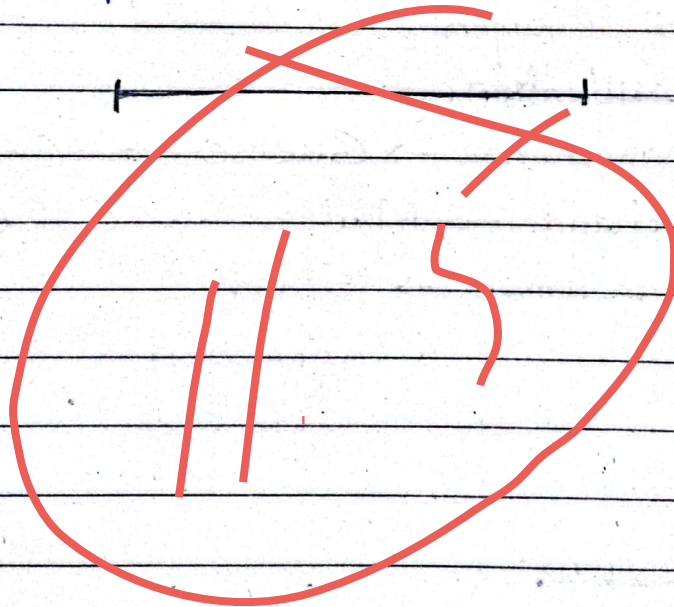
Polysaccharide \rightarrow Starch
Glycogen
Cellulose.

Functions :-

- Major Source of Energy
- Energy Storage
- Build macromolecules
- Assit lipid metabolism
- Help body functions.

D. Importance of Preservatives and Antioxidants in Food:

- Helps remove remove radicals.
- Avert dangerous effects of oxidants
- Stop oxidative stress.
- Helps preserve food.
- Alleviate micro-organisms in food.
- Resists fermentation.
- Stop bacterial and fungal growth.
- Protects the benefits and energy of food.
- Maintain the original structure and shape of food.

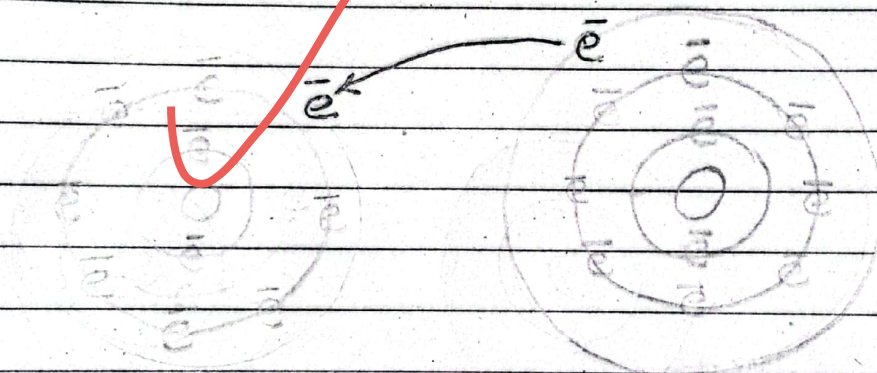


QUESTION # 02

A. ANSWER

Octet Rule :

" Every element tend to bond in such a way that it has eight electron in its valence shell, giving it a same electronic configuration as noble gases.



Diagrammatic expression of octet Rule during chemical bonding.

Noble Gases.

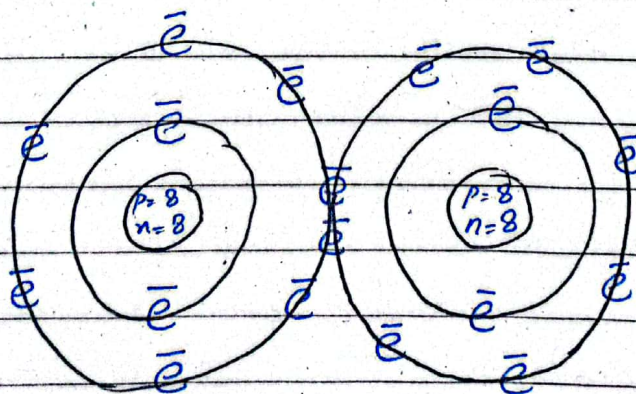
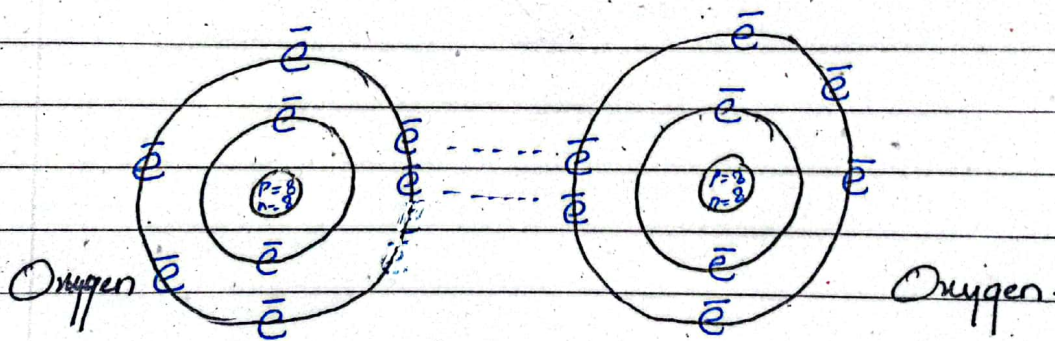
Noble gases are stable gases, tabulated in Group-VIII of periodic table, having eight electrons in valence shell and thus completing their valency according to octet Rule. e.g. Neon, Krypton, Argon, Helium.

Covalent Bond:

Definition: Covalent bond is a type of chemical bond which is formed by sharing of electrons between atoms.

Example:

In chemical bond of O_2 molecule, each atom shares two electrons in order to complete octet rule and becomes stable.



O_2 molecule. (Covalent bond).

3. Why water molecule is angular in structure?

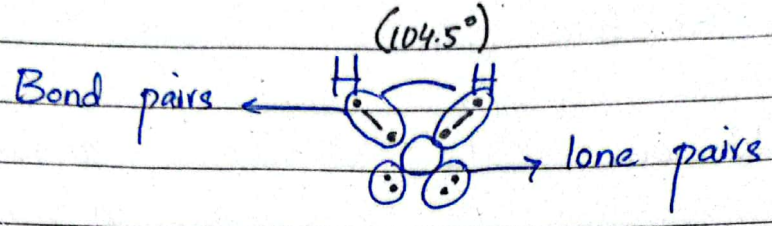
Reason. Water molecule is angular in structure due to dipole moment or repulsion forces between two lone pairs in oxygen atoms.

Explanation.

Oxygen contains 6 electrons in its valence shell, in order to become stable and complete octet rule, it makes covalent bond with two hydrogen atoms to form water or H_2O molecule. In this molecule oxygen bonds two electrons with two electrons of both hydrogens thus having bonded electron. The remaining two pairs of electrons which do not participate in chemical bond are called lone pairs.

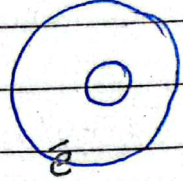
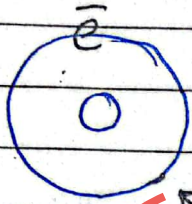
As every electrons are negatively charged and are repulsed from each other, this repulsion is called as dipole moment and is greater in lone pair : lone pair making an angle of 104.5° . Thus, water molecule (H_2O) is angular in shape.

Illustration.

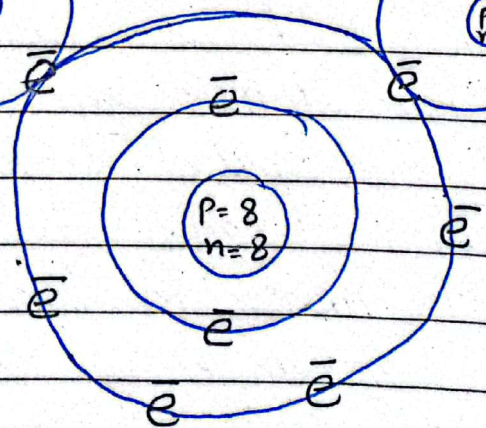
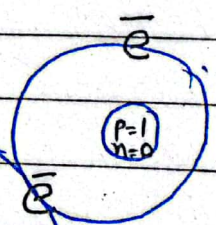
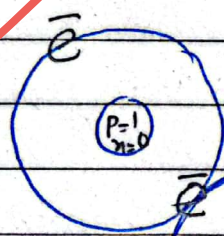
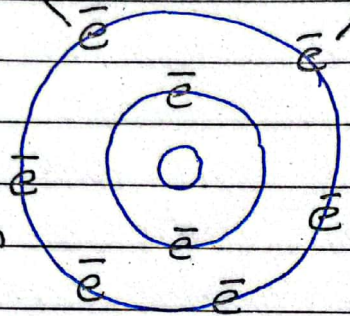


Hydrogen Atom

Hydrogen Atom



Oxygen Atom



Covalent bond in H₂O

1c) Human Brain:

Structure:

Human Brain consists of two hemispheres (right and left) connected through corpus callosum. It consists of major portion of Cerebrum, which is processing unit of Brain. It receives and commands actions through neurons. Cerebellum is another part of human Brain which functions movements, position and balance for human Body. Cerebrum is further categorized in limbic system, which involves hypothalamus, thalamus, amygdala and hippocampus, necessary for body temperature regulation, processing, pain and pleasure sensing, memory and fear response respectively.

Functions:

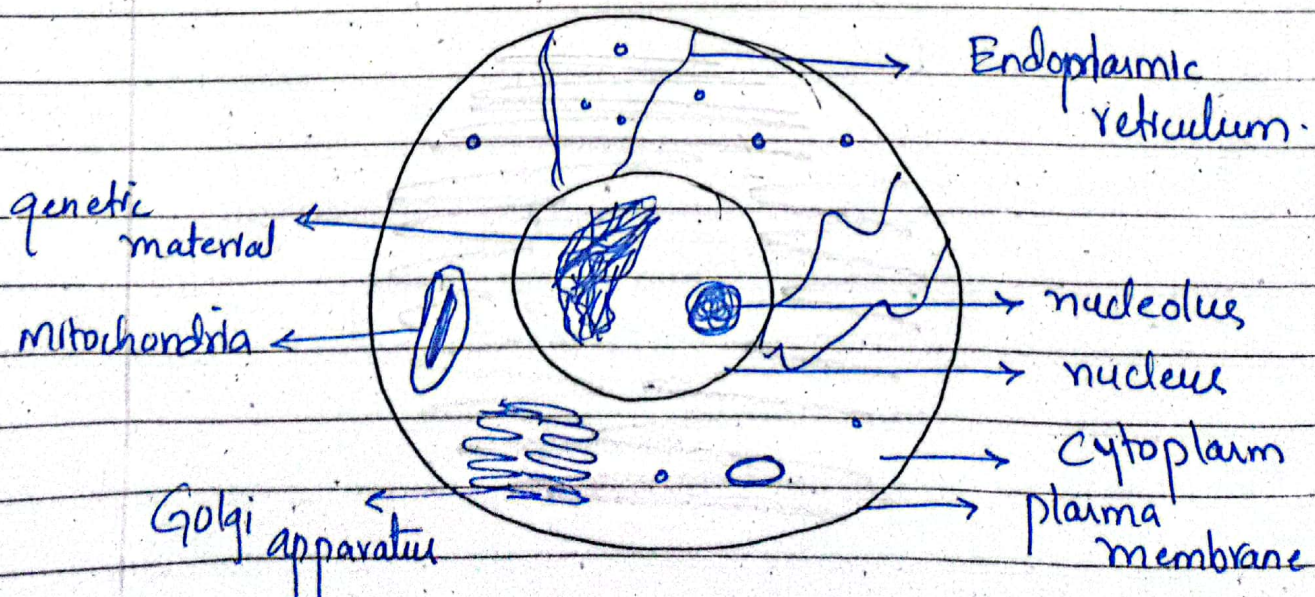
- Receives Information from receptors
- Process Information
- Regulate Involuntary movements.
- Order Commands through motor supply.
- Maintains necessary functions of heart, kidney and digestion.
- Maintains memory, pleasure and fight response.
- Cognitive and behavioural regulation.

4. Cell Structures

A cell is basic fundamental unit of life, which regulate every functions at cellular level through various process.

Structure.

A Cell consists of a nucleus, which contains genetic material and nucleolus. Cytoplasm circulate around nucleus enclosed within plasma membrane. Cytoplasm is fluid like called cytosol containing many cellular organelles for specific functions. Plasma membrane is semi-permeable membrane which check and balance the entry and exit of molecules in and out of the cell. In addition to this, plant cells contain additional membrane called Cell-wall outside plasma membrane for additional protection and strength.



Functions of atleast three Subcellular Organelles:

Mitochondria

- Production of Energy (ATP)
- Generate immunity.
- Calcium balance.
- Enzymatic Activity.

Endoplasmic Reticulum:

- Protein synthesis
- Lipid metabolism
- Calcium storage
- Removal of anti-oxidants
- Transport mechanism from plasma membrane to nuclear membrane

Glyc Apparatus:

- Process proteins received from ER
- Storage of proteins
- Packaging and transport of proteins to lysosomes or secretions.

SECTION- B

Question no: 07

a) Data:

$$\text{Ishaq can do in 6 hr} = \frac{1}{6} \text{ hr}$$

$$\text{Abbas can do in 4 hr} = \frac{1}{4} \text{ hr}$$

$$\text{Irfan can do in 8 hr} = \frac{1}{8} \text{ hr}$$

Total time taken if Abbas leaves after 2hr and Irfan joins against his place = ??

Solution:

$$\text{Total time taken} = \frac{1}{6} + \frac{1}{4} + \frac{1}{8} = \frac{1}{2}$$

$$= \frac{4+6+3-12}{24} = \frac{1}{12}$$

$$\text{Total time taken} = \underline{12 \text{ hours}}$$

b,

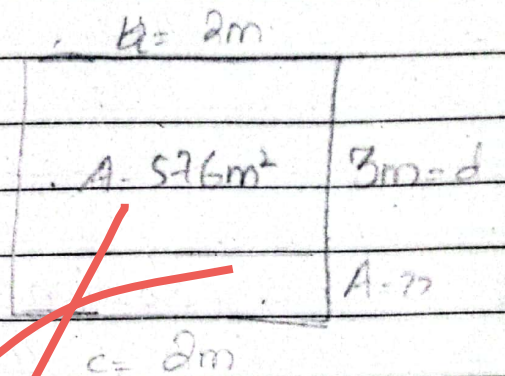
Data:

Area of the farm = 576m^2 Height of 3 sides = 2m Height of 1 side = 3m

Area of wall = ??

Solution:

If one side has 3m height
and three sides has 2m
then:



$$A = C \times B$$

$$= 3 \times 2$$

$$A = 6\text{m}^2$$

Thus area of the wall is 6m^2



(c) Data:-

7 students of ages:-

18, 18, 19, 19, 19, 21, 21

Mean = 22

Median = 22

Mode = 22

Range = 22

Solution:-

$$\text{Mean} = \frac{18+18+19+19+19+21+21}{7}$$

$$\text{Mean} = \frac{135}{7} = 17.2 \text{ Answer}$$

$$\text{Median} = 19 \text{ Answer}$$

$$\text{Mode} = 19 \text{ Answer}$$

$$\text{Range} = 21 - 18 = 3 \text{ Answer}$$

Mean:- It is average sum divided to total numbers of the given numbers.

Median:- It is the middle number of the total given data.

Mode:- It is recurrent number given in data.

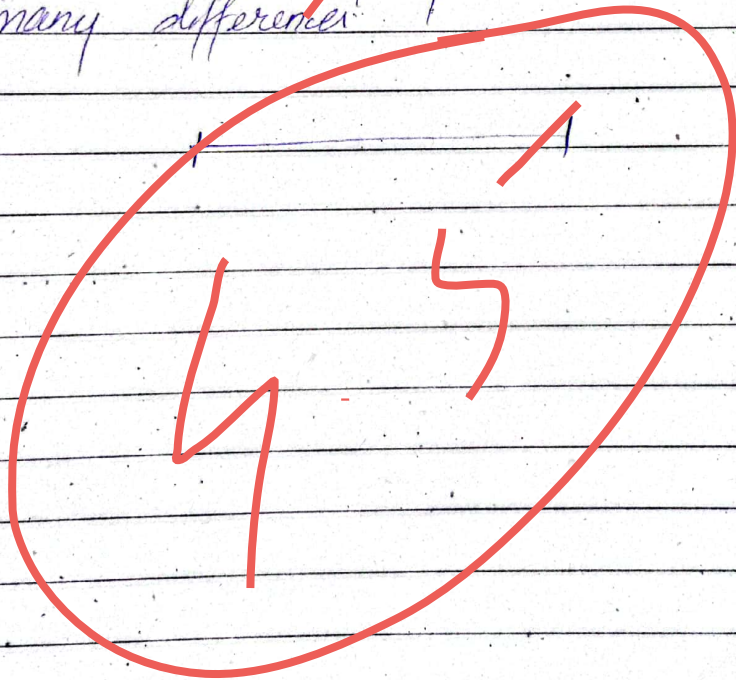
Range:- It is the difference between largest and smallest number given in data.

Q1) How does mental ability skill differ from IQ skill?

Mental stability refer to ability of processing simple problems related to numbers, arithmetic or mechanical problems

However, it included vast range of abilities from spatial to verbal abilities.

While, Intelligence quotient (IQ skill) refers to intelligence based on memory, processing and analysing every problem and issues. However, both terms are sometimes interchangeably used but have many differences.



Question # 8

a, Data:

Speed of car = $40 \text{ km/h} = v_1$
during first half.

Speed of car = $60 \text{ km/h} = v_2$
during second half

Average speed of car = $v = \Delta v$

Solution:

$$\text{Average speed of car} = \frac{\Delta v}{t}$$

$$= \frac{v_2 - v_1}{t}$$

$$= \frac{60 - 40}{t}$$

Average speed of car = 20 km/h Answer

10

b) Data:

ROSE = 6821

CHAIR = 73456

PREACH = 961473

SEARCH = ?

Solution:

Analysing and de-coding numbers on the basis of alphabets

We have,

R = 6

C = 7

O = 8

H = 3

S = 2

A = 4

E = 1

I = 5

P = 9

Thus,

SEARCH = 214673

Answer

(c) Data:

A is Brother of B

B is sister of C

C is father of D

How D is related to A

If D is male member = ??

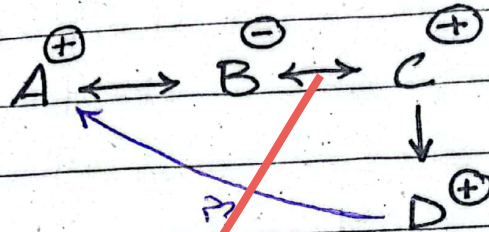
Illustration

⊖ = Female

⊕ = Brother

↔ = Siblings

↓ = Children



Solution:

D is nephew to A. Answer.



id. Data:

Kashmala travels to west = 35 km

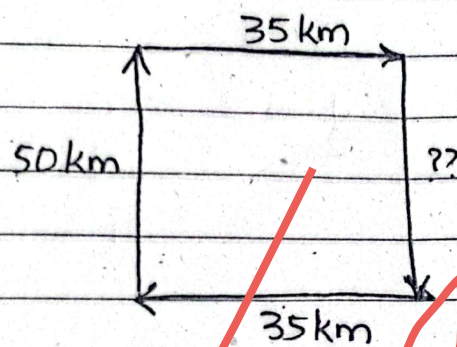
Kashmala travels to right = 50 km

Kashmala travels to another right = 35 km

Distance from original position = ??

Solution:

Illustration:



According to mathematical rules the distance travelled by Kashmala (50 km) after taking right turn is equal to shortest distance between initial and final points.

Thus, the distance from her original position is 50 km. Answer.